

CLAIMS

What is claimed is:

1. An apparatus for the production of a metal container, the apparatus comprising:

at least one die (1,2) having an insert (12) adapted to reduce the thickness of the container side wall by ironing;

at least one coolant die (3,4,5,6) adjacent the ironing die(s) and having an internal cooling cavity (8) for circulating coolant within the coolant die and adjacent the ironing insert (12) of the ironing die (1,2).

2. An apparatus according to claim 1, in which the cooling cavity has an inlet (9) and an outlet (10), the outlet including a restrictor (11).

3. An apparatus according to claim 1 or claim 2, in which the coolant die (3,4,5,6) includes a vacuum port (14) for removal of debris.

4. An apparatus according to any one of claims 1 to 3, in which an exit coolant die (6) includes an array of air jets (15) arranged around its inner surface to prevent debris from settling on the surface of the can.

5. An apparatus according to any one of claims 1 to 4, in which the cooling cavity (8) includes a portion which is inclined towards the adjacent die insert (12) to form a cooling face.

6. An apparatus according to claim 5, further comprising a system for biasing the cooling face (18) against the ironing die.

7. An apparatus according to claim 6, in which the cooling face (18) is formed from an annular piston (17) which is resiliently mounted on the body of the coolant die, the biasing system for activating the piston being provided by cooling fluid pressure.

8. An apparatus according to any one of claims 1 to 7, further comprising, a ram (20) having a cooling tube assembly (30) at one end and a punch (50) at the other end, the punch being connected to the ram by a ram spigot (25).

9. An apparatus according to claim 8, in which a cooling fluid inlet is formed partly between inner and outer concentric tubes (31,32) of the cooling tube assembly (30) and partly between an axial extension of the inner tube (31) of the cooling tube and the inside of the ram spigot (25).

10. An apparatus according to claim 9, further comprising a cavity (26) adjacent the punch nose (21) which is connected to the cooling fluid inlet by one or more holes (22), the cavity (26) being further connected to a cooling fluid outlet by one or more holes (28), the cooling fluid outlet being formed (a) between the punch and the outside of the ram spigot, (b) by one or more holes in the body of the ram and (c) between the outer tube (32) of the cooling tube assembly (30) and the inside of the ram (20).

11. An apparatus according to any one of claims 1 to 10, further comprising a tubular assembly (60) for guiding the ram (20) along its bore, the assembly having a fluid inlet (62), a fluid outlet and grooves (63) around the surface of the bore for passage of cooling fluid around the outside of the ram (20).